



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

D350-748-101
Job Sheet 174633



Part No: D350-748-101

Job Qty: 1 ea

Part Name: FWD Crosstube AS350 / AS355



Part Weight: 0 lbs

Status: Scheduled

Priority: Medium

Job Created: 3/20/18

Job Tracking No:

Due Date: 7/20/18

Created By: Marie Lajeunesse

Type: SOLD

Description:

Note: DWG REV H IPP Rev:A New Issue 06-07-05 JLM IPP Rev:B Update qty of MS21042L5 06-09-12 KJ VERIFY BY:DD IPP Rev:C Rev B 07-11-15 DD IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F 10.08.04 added QSI010 4.3 DD verf:EC IPP Rev:G ADD UNDER BEND COMMENT 12-05-28 JLM IPP REV:H 12.11.05 as per dwg D350-748-141G DD verf:JLM IPP REV:I 15.03.19 as per dwg D350-748-141revH dd verf:jlm

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea	7/19/18	7/19/18	0.00	0.00	Start Up Crosstubes-1		GP 18-07-18
110	CNC Bend Skidtubes	1 pcs	7/19/18	7/19/18	0.00	2.86	CNC Bend Skidtube		GP 18-07-18
120	Crosstubes	1 pcs	7/19/18	7/19/18	0.00	1.94	Crosstubes-2		GP 18-07-18
125	Outsource	1 pcs	7/19/18	7/19/18	0.00	0.00	Outsource1		CT 18-07-19
126	Packaging	1 pcs	7/19/18	7/19/18	0.00	0.00	Packaging2		GP 18-07-23
127	QC	1 pcs	7/19/18	7/19/18	0.00	0.00	QC15		PD 18-07-26
128	Crosstubes	1 pcs	7/19/18	7/19/18	0.00	1.94	Crosstubes-2		
130	Crosstubes	1 pcs	7/19/18	7/19/18	0.00	1.94	Crosstubes-2		
140	QC	1 pcs	7/19/18	7/19/18	0.00	0.00	QC5		PD 18-05-03
150	Outsource	1 pcs	7/19/18	7/19/18	0.00	0.00	Outsource3		CT 18-07-19
160	Packaging	1 pcs	7/19/18	7/19/18	0.00	0.00	Packaging2		GP 18-07-23
170	QC	1 pcs	7/19/18	7/19/18	0.00	0.00	QC6		38
174	Outsource	1 pcs	7/19/18	7/19/18	0.00	0.00	Outsource2		9-89
176	Packaging	1 pcs	7/19/18	7/19/18	0.00	0.00	Packaging2		
178	QC	1 pcs	7/19/18	7/19/18	0.00	0.00	QC5		
180	SprayPaint	1 pcs	7/19/18	7/19/18	0.00	0.97	Spray Paint		
190	QC	1 pcs	7/19/18	7/19/18	0.00	0.00	QC14		
200	Crosstubes	1 pcs	7/20/18	7/20/18	0.00	1.94	Crosstubes-2		
210	QC	1 pcs	7/20/18	7/20/18	0.00	0.00	QC5		
220	Packaging	1 pcs	7/20/18	7/20/18	0.00	0.00	Packaging1-3		
230	QC	1 pcs	7/20/18	7/20/18	0.00	0.00	QC4		
235	DC	1 pcs	7/20/18	7/20/18	0.00	0.00	DC		
240	Packaging	1 pcs	7/20/18	7/20/18	0.00	0.00	Packaging3-1		
250	QC21-FG	1 Ea	7/20/18	7/20/18	0.00	0.00	QC21		

Part Op 110 - Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT _____ ****UNDER
Descriptions: BEND .225" PER SIDE**** USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

120 - ****VERIFY CROSSTUBE DIMENSIONS AS PER DWG****

125 - ISSUE P/O TO METCOR: 040539 ****Stress relief*** Heat treat crosstube as per QSI010 4.3 within 12h after bending

127 - ***MARK CUT LINES***

128 - CUT TUBE AT HEIGHT ON FAI SHEET VERF HEIGHT _____ BY QC 15 LEVEL INSPECTOR _____

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: <u># 174633</u> Part No. <u>350-748-101</u> NCR No. _____		DISPOSITION Rework ☐ Scrap ☒ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table border="0"> <tr> <td>Skid-tube ☐</td> <td>Cross tube ☐</td> <td>Water Jet ☐</td> <td>Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coor. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coor. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐																																																																											
Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐																																																																																																
Machining ☐	Small Fab ☐	Prod. Eng. Coor. ☐	Quality ☐																																																																																																
Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐																																																																																																
Large Fab ☐	Composite ☐	Supplier ☐																																																																																																	
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval																																																																																												
Description Work Order Deviation				Disposition			Completed By																																																																																												
tube came back from Cadorath and failed.				SCRAP			Lead hand / Supervisor Approval Verification																																																																																												
							QC / QA Coordinator Approval																																																																																												
							68 9-89 JUL 22 2019																																																																																												
Root Cause <table border="0"> <tr> <td>Environment ☐</td> <td>No Re-verification ☐</td> <td>Pressure/Forced ☐</td> <td>Temperature/Cure ☐</td> <td>Power Loss/Surge ☐</td> <td>Positioned Wrong ☐</td> </tr> <tr> <td>Design ☐</td> <td>Operator ☐</td> <td>Bending ☐</td> <td>Set-up ☐</td> <td>Folio/Program ☐</td> <td>Outside Dimensions ☐</td> </tr> <tr> <td>Doc/Data ☐</td> <td>Offset/Setup ☐</td> <td>Centre Not Concentric ☐</td> <td>BOM/Route ☐</td> <td>Grain ☐</td> <td>Over/Under tolerance ☐</td> </tr> <tr> <td>Equip/Tooling ☐</td> <td>Supplier ☐</td> <td>Cracks ☐</td> <td>Broken/Damage/Defect ☐</td> <td>Weld ☐</td> <td>Part Incorrect ☐</td> </tr> <tr> <td>Handling/Pre ☐</td> <td>Training ☐</td> <td>Crimp/Kink/Ripple/Wave ☐</td> <td>Inspection Incomplete/Unqualified ☐</td> <td>Wrong Stock Pulled ☐</td> <td>Part Lost/Missing ☐</td> </tr> <tr> <td>Material ☐</td> <td>Use for Testing ☐</td> <td>Cuffs ☐</td> <td>Contamination ☐</td> <td>Out of Sequence ☐</td> <td>Part Moved ☐</td> </tr> <tr> <td>Internal Transport ☐</td> <td>Poor Information ☐</td> <td>Crushing ☐</td> <td>Countersink ☐</td> <td>Off-set ☐</td> <td>Drawing ☐</td> </tr> <tr> <td>Tribal Knowledge ☐</td> <td>Rushing ☐</td> <td>Heat Treat ☐</td> <td>Cut Too Short ☐</td> <td>Mislabeled ☐</td> <td>Finish ☐</td> </tr> <tr> <td>LOA ☐</td> <td>Product Improvement ☐</td> <td>Wave/Twist in Tube ☐</td> <td>Instructions Incomplete/Unclear ☐</td> <td>Fit/Function ☐</td> <td>Misread ☐</td> </tr> <tr> <td>Substation ☐</td> <td>Process Improvement ☐</td> <td>Marks/Chatter ☐</td> <td>Drill Holes ☐</td> <td>Misaligned/off center ☐</td> <td>Turning Sequence ☐</td> </tr> <tr> <td>Past Expiry Date ☐</td> <td>Manufacturing Process ☐</td> <td colspan="4"></td> </tr> <tr> <td>Misidentified ☐</td> <td>Past Due ☐</td> <td colspan="4">OTHER :</td> </tr> </table>				Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐	Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐	Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐	Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐	Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐	Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐	Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐	Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐	LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐	Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐	Past Expiry Date ☐	Manufacturing Process ☐					Misidentified ☐	Past Due ☐	OTHER :				FAULT CATEGORY <table border="0"> <tr> <td>Power Loss/Surge ☐</td> <td>Positioned Wrong ☐</td> </tr> <tr> <td>Folio/Program ☐</td> <td>Outside Dimensions ☐</td> </tr> <tr> <td>Grain ☐</td> <td>Over/Under tolerance ☐</td> </tr> <tr> <td>Weld ☐</td> <td>Part Incorrect ☐</td> </tr> <tr> <td>Wrong Stock Pulled ☐</td> <td>Part Lost/Missing ☐</td> </tr> <tr> <td>Out of Sequence ☐</td> <td>Part Moved ☐</td> </tr> <tr> <td>Off-set ☐</td> <td>Drawing ☐</td> </tr> <tr> <td>Mislabeled ☐</td> <td>Finish ☐</td> </tr> <tr> <td>Fit/Function ☐</td> <td>Misread ☐</td> </tr> <tr> <td>Misaligned/off center ☐</td> <td>Turning Sequence ☐</td> </tr> </table>				Power Loss/Surge ☐	Positioned Wrong ☐	Folio/Program ☐	Outside Dimensions ☐	Grain ☐	Over/Under tolerance ☐	Weld ☐	Part Incorrect ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐	Out of Sequence ☐	Part Moved ☐	Off-set ☐	Drawing ☐	Mislabeled ☐	Finish ☐	Fit/Function ☐	Misread ☐	Misaligned/off center ☐	Turning Sequence ☐
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐																																																																																														
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐																																																																																														
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐																																																																																														
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐																																																																																														
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐																																																																																														
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐																																																																																														
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐																																																																																														
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐																																																																																														
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐																																																																																														
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐																																																																																														
Past Expiry Date ☐	Manufacturing Process ☐																																																																																																		
Misidentified ☐	Past Due ☐	OTHER :																																																																																																	
Power Loss/Surge ☐	Positioned Wrong ☐																																																																																																		
Folio/Program ☐	Outside Dimensions ☐																																																																																																		
Grain ☐	Over/Under tolerance ☐																																																																																																		
Weld ☐	Part Incorrect ☐																																																																																																		
Wrong Stock Pulled ☐	Part Lost/Missing ☐																																																																																																		
Out of Sequence ☐	Part Moved ☐																																																																																																		
Off-set ☐	Drawing ☐																																																																																																		
Mislabeled ☐	Finish ☐																																																																																																		
Fit/Function ☐	Misread ☐																																																																																																		
Misaligned/off center ☐	Turning Sequence ☐																																																																																																		

VERF TWIST 0.309 BY QC15 LEVEL INSPECTOR _____

130 - 2- Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs, Set-up drill table as per QSI 010 3- Deburr
4- Engrave Part # and Batch # as per Dwg D350-748-141 5- Remove all marks from tube within limits of D350-748-141 6-
Apply a light coat of LPS3 on the interior of tube Batch: _____

140 - CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)

150 - Issue P/O: 0406894 Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadum
Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier:
Southwest United Industries Ensure Certificate of Conformity is attached

160 - Ensure certificate of conformity is attached

174 - ISSUE P/O TO ACUREN: _____

180 - 1-Prime inside and out crosstube as per QSI 005 4.2 2-Paint Outside of Tube as per Dart QSI 005 4.2

190 - Then, Wrap in plastic bag to protect from scratches

200 - INSTALL GROUND WIRE INSERT, THEN INSERT SCREW AND WASHER 2-Install supports with Proseal 890 per
D350-748-141 and QSI 015 EXP: _____ 3-Install supports clamps Using Dt8876 as per Dwg D350-748-
141, Torque to 60-80 IN-LBS. ***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 72HOURS
AS PER DWG.***

235 - Photocopy bluefile & type labels per PPPD350-748-101 CHG003

240 - Identify and pack for shipping as per PPP D350-748-101

Job BOM

Part / Item	Component Name	Quantity	Operation	Container
D350-748-141TRN	Crosstube Turning Detail	1 Ea (1 ea)	90-Start up Operation	
ALS4-1032-225	Rivnut	1 Ea (1 ea)	200-Crosstubes	
D3502-1	Support	2 Ea (2 ea)	200-Crosstubes	
D5123-7	Clamp Cushion	2 Ea (2 ea)	200-Crosstubes	
MS21920-20	Clamp	2 Ea (2 ea)	200-Crosstubes	
MS27039-1-10	Screw	1 Ea (1 ea)	200-Crosstubes	
NAS1149D0363J	Washer	1 Ea (1 ea)	200-Crosstubes	
AN4-41A	Bolt	8 Ea (8 ea)	220-Packaging	
AN4-6A	Bolt	16 Ea (16 ea)	220-Packaging	
AN5-32A	Bolt	4 Ea (4 ea)	220-Packaging	
D3500-1	Saddle	4 Ea (4 ea)	220-Packaging	
D3501-1	Bushing	16 Ea (16 ea)	220-Packaging	
MS21042L4	Nut	24 Ea (24 ea)	220-Packaging	
MS21042L5	Nut	4 Ea (4 ea)	220-Packaging	
NAS1149D0463J	Washer	32 Ea (32 ea)	220-Packaging	
NAS1149D0563J	Washer	8 Ea (8 ea)	220-Packaging	

Job Allocations

Operation	Component Part	Required	Inventory	Allocated
90-Start up Operation <u>50 73 831</u>	D350-748-141TRN	1	0	0
200-Crosstubes	ALS4-1032-225	1	1,149	0
	D3502-1	2	62	0
	D5123-7	2	145	0
	MS21920-20	2	108	0
	MS27039-1-10	1	313	0
	NAS1149D0363J	1	3,131	0
220-Packaging	AN4-41A	8	230	0
	AN4-6A	16	620	0
	AN5-32A	4	114	0
	D3500-1	4	101	0
	D3501-1	16	99	0
	MS21042L4	24	2,466	0
	MS21042L5	4	722	0
	NAS1149D0463J	32	3,386	0
	NAS1149D0563J	8	2,107	0

DART
AEROSPACE

Container No: S093217



Part: D350-748-101

Job No: 174633

Serial No/Batch: S093217

Revision:

Inspector:

Exp Date:

Instructions:

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
CANADA
TEL.: 1 813 632-5200
Email: sales@dartaero.com
www.dartaerospace.com

ifications

ould not be found.

Plex 3/20/18 10:40 AM Dart.lajeunesse.marie

Date: 07/18/18

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

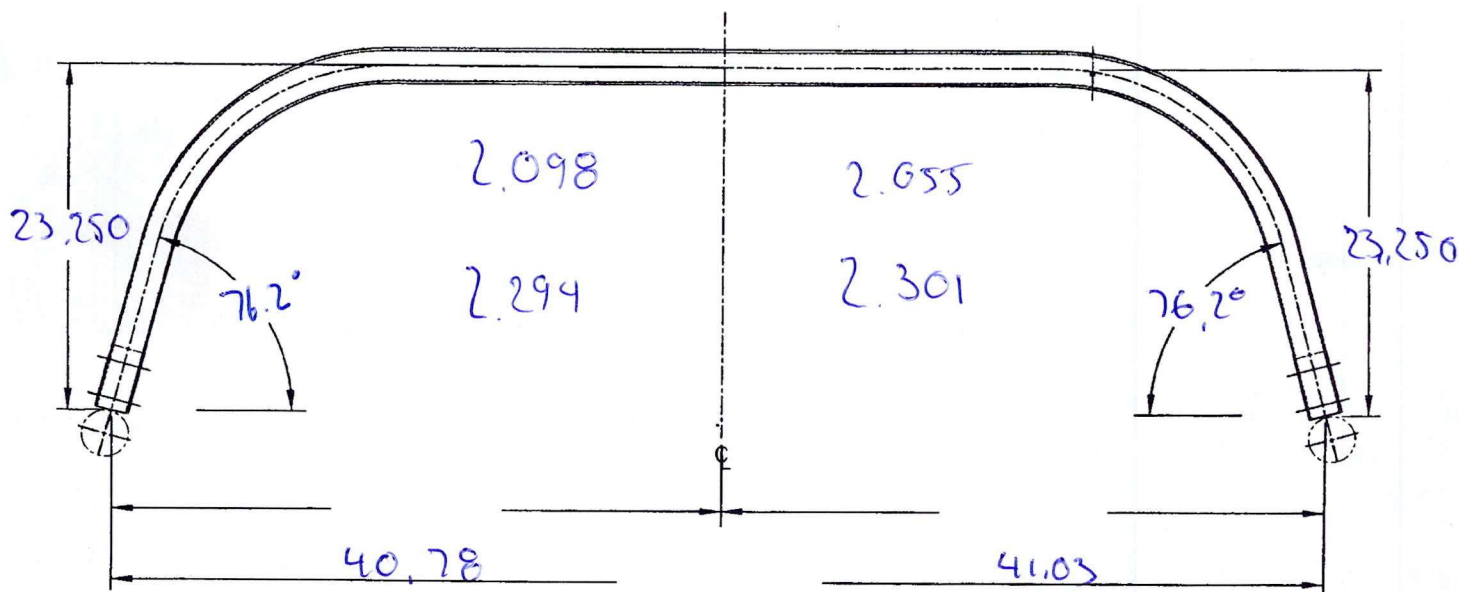
QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor Approval Verification	
				QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY			
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐	Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐	Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : ☐					

DART AEROSPACE LTD		Work Order:	174633
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: H		Page 1 of 1	

Required Dimension	Min	Max
Height	23.00	23.50
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	--
Crushing	--	8%
Twist	--	0.38



	Side A	Side B
Bending Passes	36	38
Crushing	4.5%	5.6%
Comments		

QC15 Inspection	PD
Date	18-07-26

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	
D	12.04.16	Added bending, crushing & twist dimensions	KJ	
E	13.02.27	Dwg Rev updated	KJ	
F	14.02.13	Crushing & twist dimensions revised	KJ	
G	14.11.10	Height dimension revised	KJ	
H	15.04.14	Dwg Rev updated	KJ	
I	15.09.09	Crushing dimension revised	KJ	

Item	Qty	Part Number	Description
	-141		
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D5123-7	CLAMP CUSHION
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (OR MS21920-21/-22, PER DART SPEC. M-MS21920-20/-21/-22)
8	1	MS27039-1-10	SCREW
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH AFTER TURNING = 112.270±0.06 (AFTER BENDING/TRIMMING = 110.27 REF)
- FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 30.45 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS2759/1E AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.

BENDING

- ALL DIMENSIONS FOR BENT TUBE ARE POST STRESS RELIEF
- BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- MAX AMPLITUDE OF RIPPING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- AFTER BENDING, STRESS RELIEVE TUBE AT 650°F ±0.25°F FOR A MINIMUM OF 2 HRS AND ALLOW TO COOL TO AMBIENT TEMPERATURE (REF AMS2759/1E).
- MAX TWIST AFTER STRESS RELIEF: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- TO INSTALL D3502-1 SUPPORT: ABRABE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER

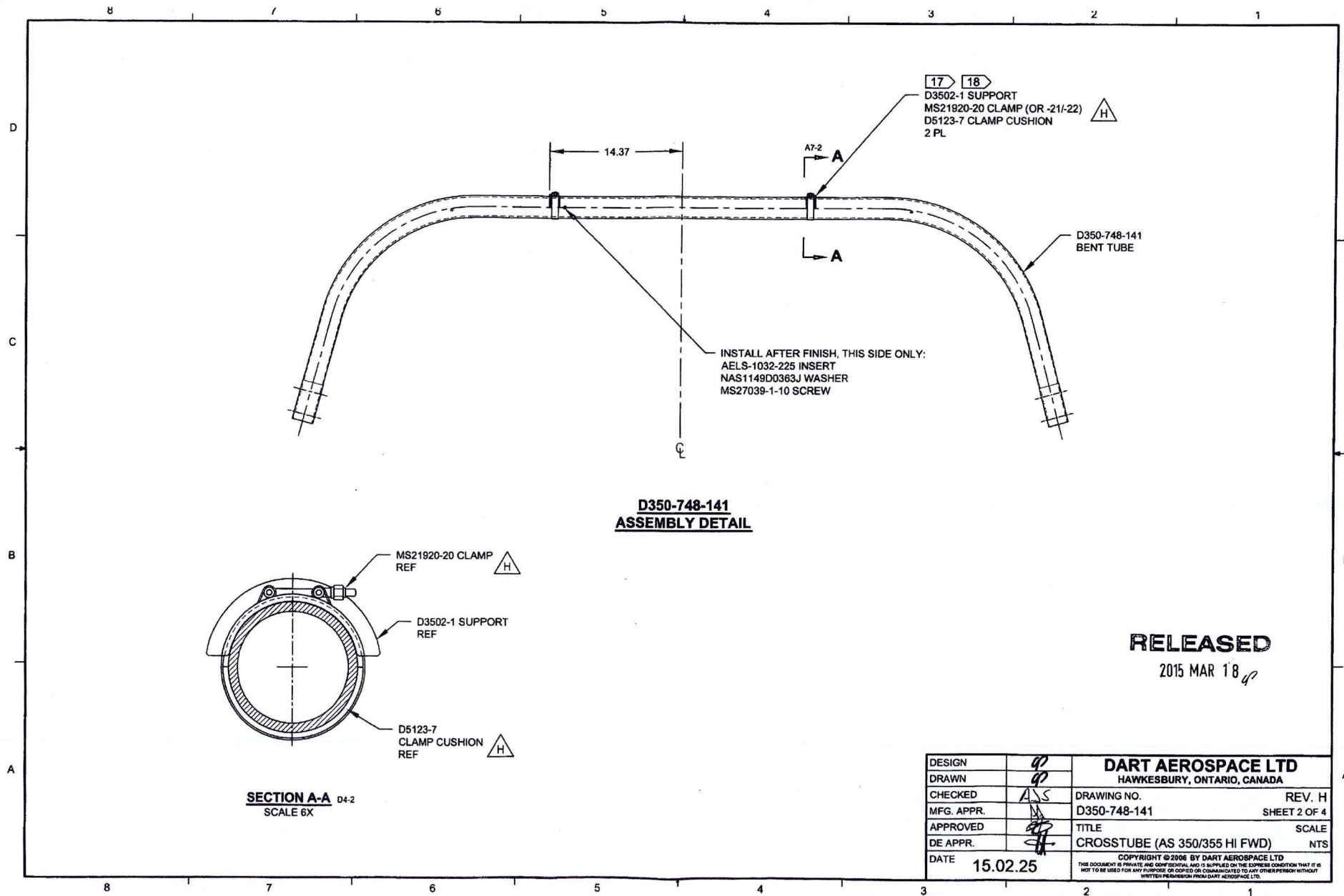
NO. 174633 *ML5*
18-03-20

RELEASED

2015 MAR 18

9 EEN 15-547

H	D5123-7 WAS D3595-063-395, MS21920-20 WAS -22, ALLOWABLE CRUSHING NOW 8% WAS 7%	CP	15.02.25
G	RMV ABRASION STRIP, SUPPORT NOW W/ PROSEAL & CUSHION, ADD STRESS RELIEF, LONGER CUFF, NOW TRIM'D AFTER BEND, ADD WALL DIMS & UPDATE TOL.	CP	12.09.12
F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>9</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	<i>9</i>		
CHECKED	<i>AS</i>	DRAWING NO.	REV. H
MFG. APPR.	<i>AS</i>	D350-748-141	SHEET 1 OF 4
APPROVED	<i>AS</i>	TITLE	SCALE
DE APPR.	<i>AS</i>	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	15.02.25	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

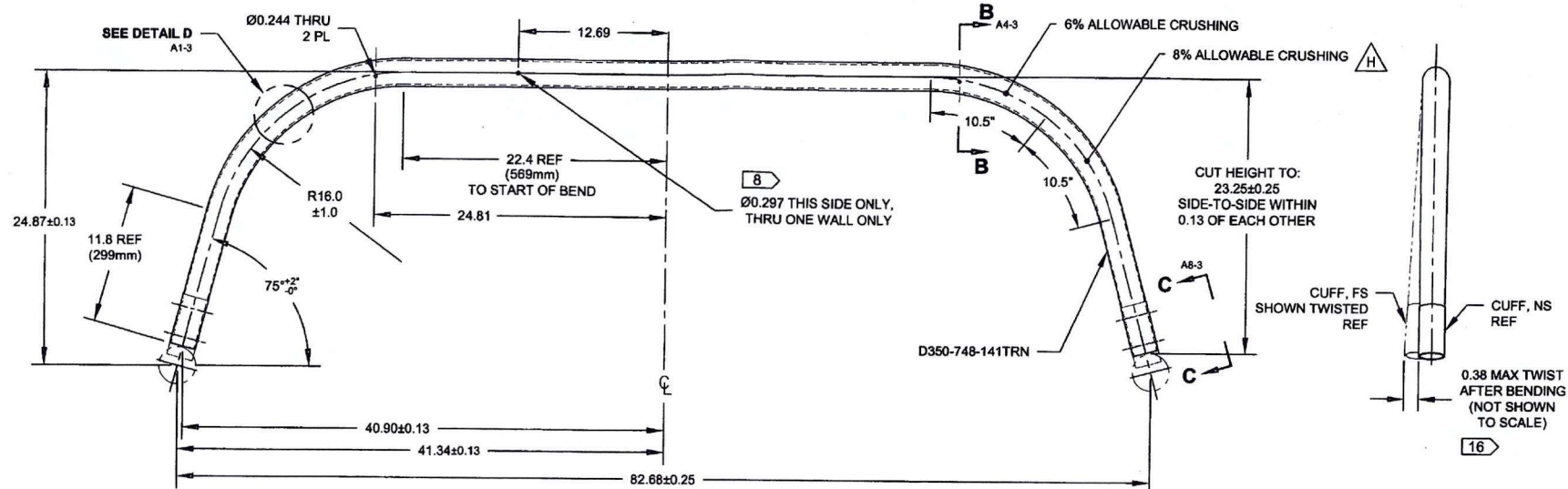


**D350-748-141
ASSEMBLY DETAIL**

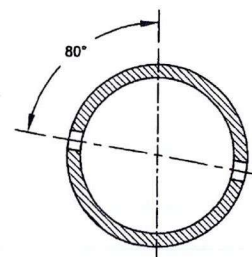
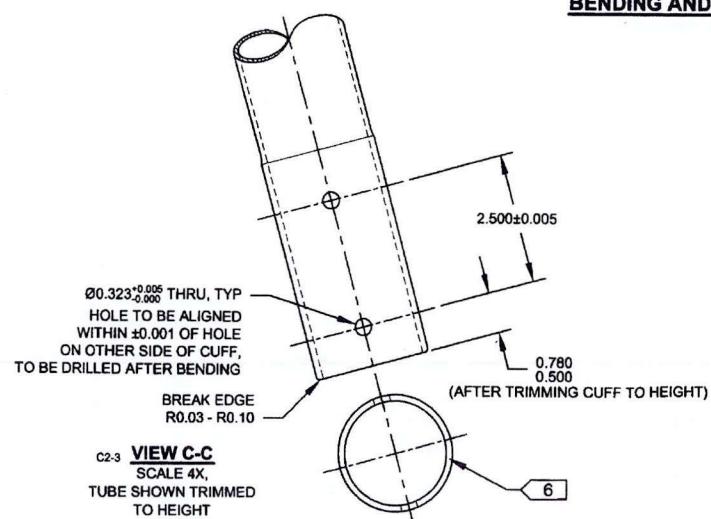
RELEASED

2015 MAR 18

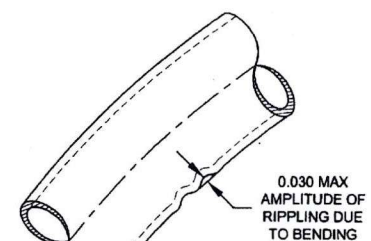
DESIGN	90	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	90		
CHECKED	ASS	DRAWING NO.	REV. H
MFG. APPR.	NA	D350-748-141	SHEET 2 OF 4
APPROVED	90	TITLE	SCALE
DE APPR.	90	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	15.02.25	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	



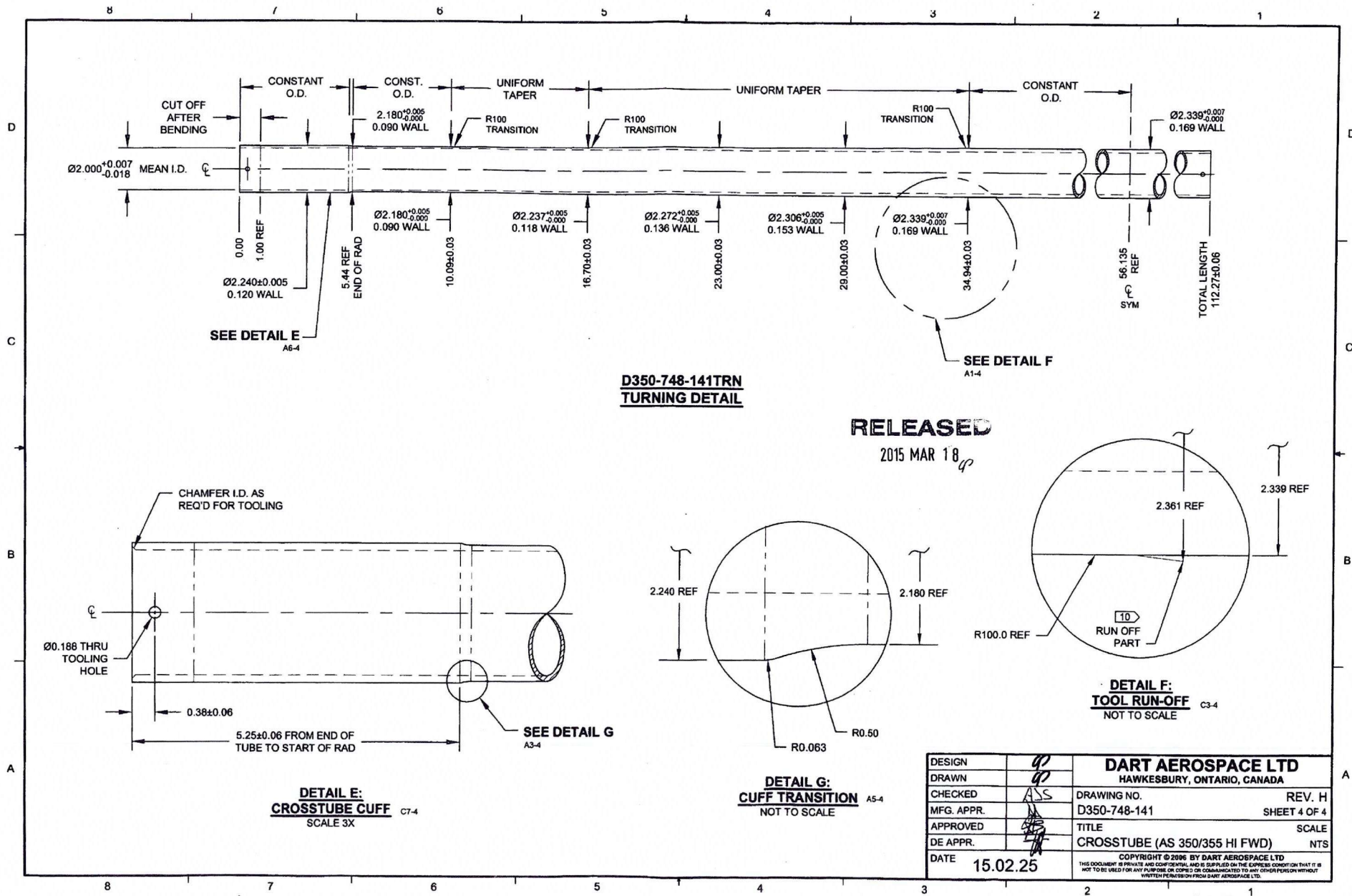
D350-748-141
BENDING AND DRILLING DETAIL 13



RELEASED
2015 MAR 18

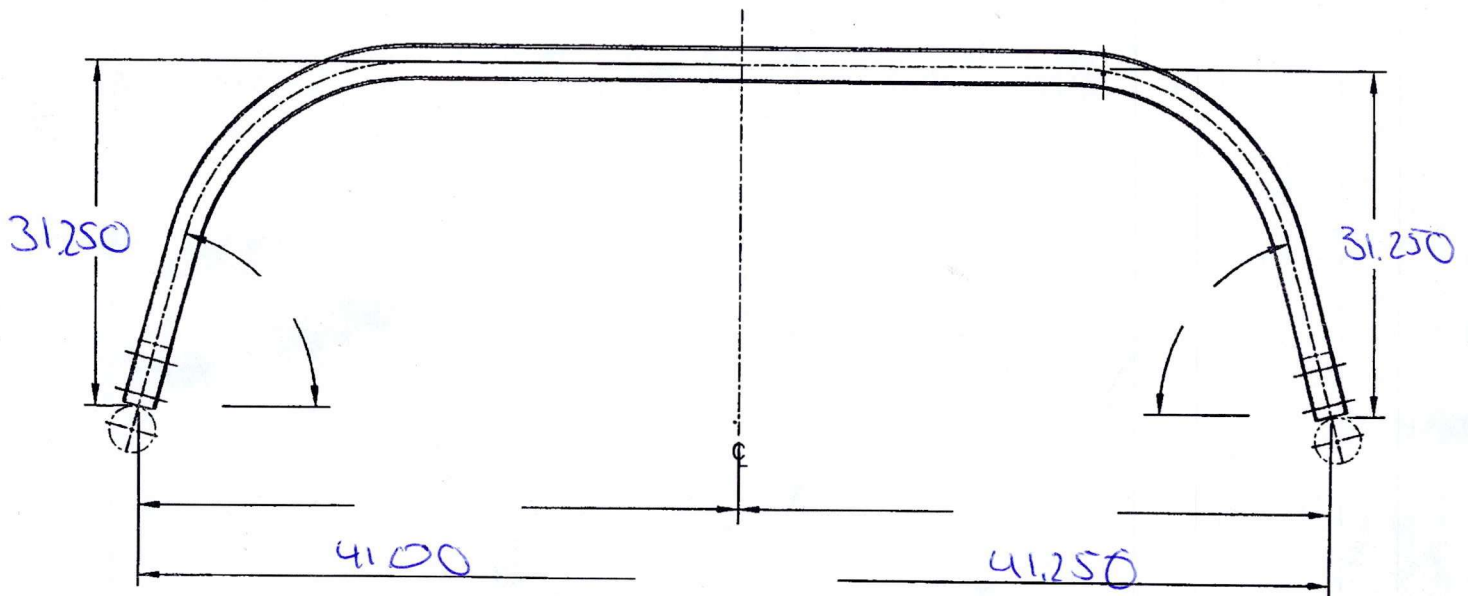


DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	AS	DRAWING NO.	REV. H
MFG. APPR.		D350-748-141	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	15.02.25	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	



DART AEROSPACE LTD	Work Order:	
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: H		Page 1 of 1

Required Dimension	Min	Max
Height	23.00	23.50
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	--
Crushing	--	8%
Twist	--	0.38



	Side A	Side B
Bending Passes		
Crushing		
Comments		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	
D	12.04.16	Added bending, crushing & twist dimensions	KJ	
E	13.02.27	Dwg Rev updated	KJ	
F	14.02.13	Crushing & twist dimensions revised	KJ	
G	14.11.10	Height dimension revised	KJ	
H	15.04.14	Dwg Rev updated	KJ	
I	15.09.09	Crushing dimension revised	KJ	



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

PURCHASE ORDER **PO040539**

Supplier: MEI001-VC
Metcor Inc.
560 Boul. Arthur Sauve
Saint-Eustache
QC
J7R 5A8 Canada
Phone: 450 473 1884
Fax: 450 491 5498

PO No: PO040539
PO Date: 7/19/18
Due Date: 7/25/18

Purchase Order
Revision:

Revision Date:

Ship-To Contact: Phone:

Via: Ground

Pymt Terms: Net 30

Freight Terms:

Special Comments:

Ship To: 1270 Aberdeen Street
Hawkesbury
ON
K6A 1K7 Canada
Phone: 613-632-5200

Items

Line Item	Job	Part	Description	Status	Account	Due Date	Order Quantity	Received Quantity	Balance	Unit Price (CAD)	Extended Price
1	174632	D350-748-101	FWD Crosstube AS350 / AS355 ISSUE P/O TO METCOR: AFTER BENDING: STRESS RELIEF AT 650° F ± 25° F FOR A MINIMUM OF 2 HRS AIR COOL TO AMBIENT TEMPERATURE DETAIL C OF C REQUIRED	Firmed	-	7/25/18	1 pcs	0 pcs	1 pcs	\$205.00/pcs	\$205.00
	174633			Firmed	-	7/25/18	1 pcs	0 pcs	1 pcs	\$205.00/pcs	\$205.00
	174634			Firmed	-	7/25/18	1 pcs	0 pcs	1 pcs	\$205.00/pcs	\$205.00
	174635			Firmed	-	7/25/18	1 pcs	0 pcs	1 pcs	\$205.00/pcs	\$205.00
	174636			Firmed	-	7/25/18	1 pcs	0 pcs	1 pcs	\$205.00/pcs	\$205.00
Sub Total:							5	0	5		\$1,025.00

Grand Total: \$1,025.00

Order Notes

CT.

DAS
38
9-89

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Certificat de Conformité Détail

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
329191	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

COMMANDE DU CLIENT customer po	CLASSIFICATION PIECE part classification	MATÉRIEL material	MAÎTRE D'OEUVRE prime contractor	PROGRAM
40539	N/A	Steel		
<u>SPÉCIFICATIONS DU PROCÉDÉ</u> processing specifications				
STRESS REL				
SAE AMS 2759/1 REV.E				
EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results				
Visual				
QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description		
5	150	D350-748-101 CROSSTUBE (5) D350-748-101 JOB 174632, 174633, 174634, 174635, 174636 1 NIL		

COMMENTAIRES / comments

STRESS RELIEF 650F, 2 HRS

Heat treatment (HT) was performed with equipment that meets the requirements of AMS2759 & AMS2750. All HT operations were in compliance with AMS2759 and all verifications have been performed and documented. No unauthorized changes were performed in regards to the HT. We certify that the material was manufactured, sampled, tested and inspected in accordance with AMS2759 and the purchase order and was found to meet the requirements. This document and any attached documents may contain confidential or proprietary information and may be subject to export control laws and regulations. If you are not the intended recipient, you are notified that any dissemination, copying of this e-mail and any attachments thereto or use of their contents by any means whatsoever is strictly prohibited. Unauthorized export or re-export is prohibited.

Le traitement thermique (TT) a été fait en utilisant des équipements en conformité avec AMS2759 et AMS 2750.

Le TT a été fait tel que requis par AMS2759 et toutes les vérifications et les tests demandés ont été faites et documentés. Aucun changement n'a été faite par rapport au TT. On certifie que le matériel a été fabriqué, échantillonné, testé et inspecté en accord avec AMS2759 et le bon de commande et le matériel rencontre les exigences spécifiées.

Ce document et les documents qui lui sont joints peuvent contenir des informations confidentielles, être soumis aux réglementations relatives au contrôle des exportations ou ayant un caractère privé. S'ils ne vous sont pas destinés, nous vous signalons qu'il est strictement interdit de les divulguer, de les reproduire ou d'en utiliser de quelque manière que ce soit le contenu. Toute exportation ou réexportation non autorisée est interdite.

Isabel Otero

QA Technician



APPROUVÉ par / Approved by:

Isabel Otero

DATE: 2018-07-19



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

PURCHASE ORDER **PO040694**

Supplier: CAD002-VC
Cadorath Coating
2150 Logan Ave.
Winnipeg
MB
R2R 0J2 Canada
Phone: 204 633 9420
Fax: 204 633 8033

PO No: PO040694
PO Date: 8/7/18
Due Date: 8/16/18
Purchase Order Revision:
Revision Date:
Ship-To Contact: Phone:

Ship To: 1270 Aberdeen Street
Hawkesbury
ON
K6A 1K7 Canada
Phone: 613-632-5200

Via: Ground
Pymt Terms: Net 30
Freight Terms:
Special Comments:

Items

Line Item	Job	Part	Description	Status	Account	Due Date	Order Quantity	Received Quantity	Balance	Unit Price (CAD)	Extended Price
1	174643	D350-748-101	FWD Crosstube AS350 / AS355 : TC STC SH06-27 Issue 2, FAA STC SR02359NY 11/03/04, EASA STC EASA.10016903 Revision 2 10/09/03, BRAZIL 2009S04-04 09/04/06 Issue P/O: Stress relief at 375degree for 5hrs Magnetic Particle Inspect per ASTM E1444 Cad Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375 defree for 8 hrs, Chromate Treat C of C req'd	Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
174634	1 X	AUG 15 2018		Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
174618	1 X	AUG 15 2018		Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
174635	1 X	AUG 15 2018		Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
174633	1 X	AUG 15 2018		Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
Sub Total:							5	0	5		\$4,025.00

Items											
Line Item	Job	Part	Description	Status	Account	Due Date	Order Quantity	Received Quantity	Balance	Unit Price (CAD)	Extended Price
2	174676	D350-748-201	Aft Crosstube AS350 / AS355 : TC STC SH06-27 Issue 2, FAA STC SR02359NY 11/03/04, EASA STC EASA.10016903 Revision 2 10/09/03, BRAZIL 2009S04-04 09/04/06 Issue P/O: Stress relief at 375degree for 5hrs Magnetic Particle Inspect per ASTM E1444 Cad Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375 defree for 8 hrs, Chromate Treat C of C req'd	Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
	174673	1	AUG 15 2018	Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
	181141	1	AUG 15 2018	Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
	181140	1	AUG 15 2018	Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
	174674	1	AUG 15 2018	Firmed	-	8/16/18	1 pcs	0 pcs	1 pcs	\$805.00/pcs	\$805.00
Sub Total:							5	0	5		\$4,025.00
										Grand Total:	\$8,050.00
Order Notes											
Terms & Condition of Purchasing(Suppliers) and Procurement Quality Clauses are an integral part of our AS9100 requirements. To learn in detail, please visit www.dartaerospace.com for further explanation.											

Plex 8/7/18 1:13 PM dart.tsimiklis.chrisoula

Packing Slip



Cadorath Coating

2150 Logan Avenue, Winnipeg, Manitoba R2R-0J2

Phone: (204) 633-9420 Fax: (204) 633-8033

INVOICE NUMBER:

S97017

Sold To:

Dart Aerospace Ltd.
1270 Aberdeen St.

Hawksbury, ON K6A 1K7

ShipTo:

Net 2% Interest Per Month charged on Overdue Accounts.

Any claims for shortages, overcharges, or damaged goods must be made within seven (7) days from receipt of goods.

Customer Order #:	DateReceived:	Terms:	G.S.T. #:	Ship Via:	Ship Date:
PO040694	Aug-14-2018	NET 30 DAYS	10071 6547 RT0001		Aug-24-2018

Item # Qty P/N & Description

1	1 EA	CROSSTUBE	S/N S094239 ✓
		P/N d350-748-101	W/O 185681
2	1 EA	CROSSTUBE	S/N S093751 ✓
		P/N d350-748-101	W/O 185682
3	1 EA	CROSSTUBE	S/N S094573 ✓
		P/N D350-748-201	W/O 185685
4	1 EA	CROSSTUBE	S/N S095366 ✓
		P/N D350-748-201	W/O 185686
5	1 EA	CROSSTUBE	S/N S095319 ✓
		P/N D350-748-201	W/O 185687
6	1 EA	CROSSTUBE	S/N S094587 ✓
		P/N D350-748-201	W/O 185688
7	1 EA	CROSSTUBE	S/N S094598 ✓
		P/N D350-748-201	W/O 185690
8	1 EA	CROSSTUBE	S/N S093762 ✓
		P/N d350-748-101	W/O 185691
9	1 EA	CROSSTUBE	S/N S092985 ✓
		P/N d350-748-101	W/O 185683
10	1 EA	CROSSTUBE	S/N S093217 ✓
		P/N d350-748-101	W/O 185684

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Aug-24-2018

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 185684

INVOICE #: 97017

**CONTRACT OR
PURCHASE ORDER #** PO040694

DESCRIPTION: CROSSTUBE

QTY 1

P/N # d350-748-101

S/N # S093217

STRESS RELIEF BAKE HEAT CHART # 18-723. MPI IAW ASTM-E-1444. FAILED MPI.

DAS
38
9-89

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:

